- 1. A method of making mesoporous silica materials, comprising the steps of
 - (a) combining a silica precursor with an aqueous solvent, an acid and a surfactant having an ammonium cation into a silica precursor solution,
 - (b) templating the silica precursor with the surfactant and obtaining the mesoporous material from the templated silica precursor,
 - (c) forming said silica precursor solution into a preform;
 - (d) rapidly evaporating said aqueous solvent from said preform for obtaining the mesoporous material, wherein the improvement comprises:
 - (i) providing said aqueous solvent in an amount resulting in complete hydrolysis and providing said acid in an amount maintaining a hydrolyzed precursor and avoiding gelation or precipitation; and
 - (ii) providing said surfactant and said silica precursor in a mole ratio that is above a lower mole ratio that produces a non-porous silica phase and below an upper mole ratio that produces a lamellar phase.
- 2. The method as recited in claim 1, wherein said lower mole ratio is about 0.05.
- 3. The method as recited in claim 1, wherein said upper mole ratio is about 0.3.
- 4. The method as recited in claim 1, wherein said acid is added in an amount resulting in a pH of said silica precursor solution of from about 1 to about 4.
- 5. The method as recited in claim 4, wherein said pH is about 2.
- 6. The method as recited in claim 1, wherein the step of forming includes diluting with an alcohol.
- 7. The method as recited in claim 6, wherein said alcohol is ethanol.
- 8. The method as recited in claim 1, wherein said aqueous solvent, said acid, and said surfactant are premixed before combining with said silica precursor.
- 9. The method as recited in claim 1, wherein said mesoporous material is in a geometric form selected from the group consisting of fiber, powder, and film.
- 10. The method as ecited in claim 1, wherein said forming is spin-casting.
- 11. The method as recited in claim 1, wherein said forming is spraying.
- 12. The method as recited in claim 1, further comprising adding a pre-polymer or a polymer to said silica precursor solution making a pituitous mixture.
- 13. The method as recited in claim 1, wherein said forming is drawing.
- 14. The method as recited in claim 1, wherein said forming is squeegeeing.
- 15. The method as recited in claim 1, further comprising the step of adding a metal compound to the silica precursor solution.
- 16. The method as recited in claim 15, wherein said metal compound is selected from the group consisting of metal halide, metal nitrate, and combinations thereof.

17. The method as recited in claim 16, wherein said metal halide is a metal chloride.

18. The method as recited in claim 16, wherein said metal is selected from the group of aluminum, iron and combinations thereof.

19 The method as recited in claim 1, wherein said silica precursor is an alkoxide silica precursor or a tetrachlorosilane.

20. The method as recited in claim 1, wherein said aqueous solvent amount is characterized by a ratio of said aqueous solvent to said silica precursor of about 7.

21. The method as recited in claim 1, wherein said acid amount is characterized by a ratio of said acid to said silica precursor of about 0.1.

22. The method as recited in claim 1, further comprising adding a swelling agent to the silica precursor solution.

23. The method as recited in claim 22, wherein said swelling agent is 1,3,5-thimethylbenzene.

24. The method as recited in claim 1, further comprising the step of calcining the mesoporous material.

25. A method of making a mesoporous silica film, comprising the steps of

- (a) combining a silica precursor with an aqueous solvent, an acid and a surfactant having an ammonium cation into a silica precursor solution,
- (b) templating the silica precursor with the surfactant and obtaining the mesoporous material from the templated silica precursor,
- (c) forming said silica precursor solution into a preform; and
- (d) rapidly evaporating said aqueous solvent from said preform for obtaining the mesoporous material, wherein the improvement comprises:

(i) said silica precursor is tetraethoxysilane;

(ii) providing said aqueous solvent in a superstoichiometric amount and providing said acid in an amount

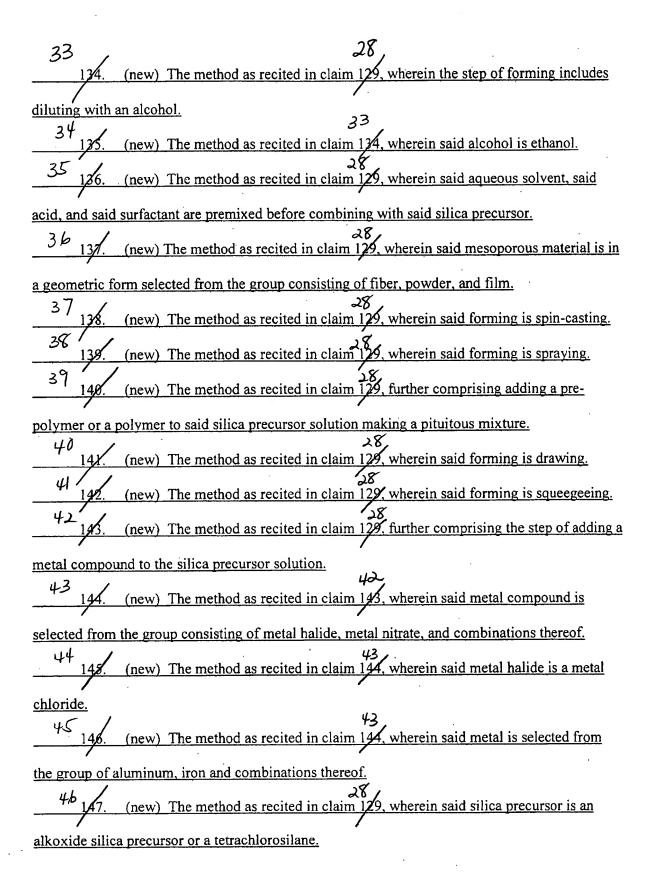
maintaining a hydrolyzed precursor and avoiding gelation or precipitation;

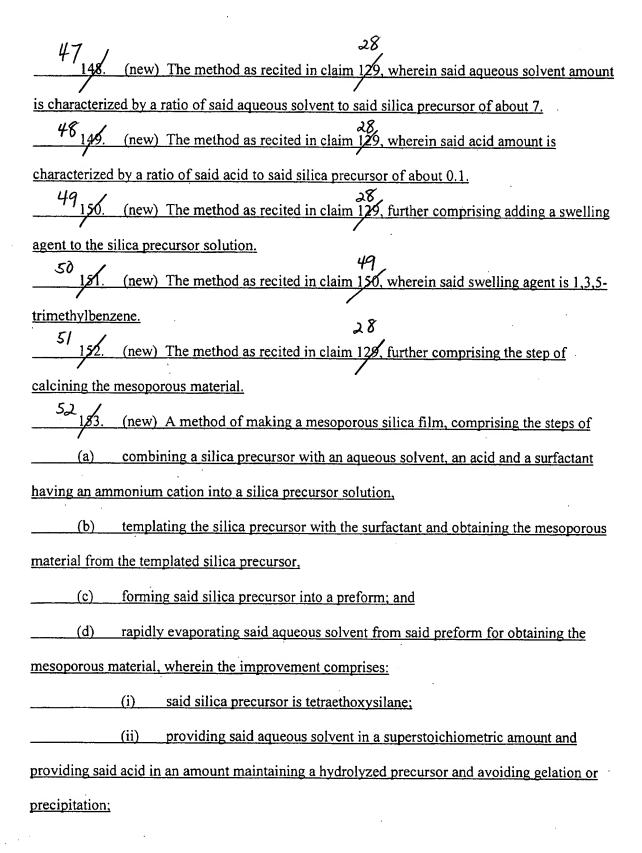
(iii) providing said surfactant and said silica precursor in a mole ratio that is above a lower mole ratio that produces a non-porous silica phase and below an upper mole ratio that produces a lamellar phase; and (iv) said forming includes diluting with an alcohol.

26. The method as recited in claim 26, further comprising adding a pre-polymer or a polymer to said silica precursor solution making a pituitous mixture.

27. The method as recited in claim rapidly evaporating is by spin-casting.

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129.	(new) A method of making mesoporous silica materials, comprising the steps of
(a)	combining a silica precursor with an aqueous solvent, an acid and a surfactant
having an am	monium cation into a silica precursor solution,
(b)	templating the silica precursor with the surfactant and obtaining the mesoporous
material from	the templated silica precursor,
(c)	forming said silica precursor solution into a preform; and
(d)	rapidly evaporating said aqueous solvent from said preform for obtaining the
mesoporous r	naterial, wherein the improvement comprises:
	(i) providing said aqueous solvent in an amount resulting in complete
hydrolysis an	d providing said acid in an amount maintaining a hydrolyzed precursor and
avoiding gela	tion or precipitation; and
	(ii) providing said surfactant and said silica precursor are in a mole ratio that
is above a lov	wer mole ratio that produces a non-porous silica phase and below an upper mole
~	duces a lamellar phase. 28
29	(new) The method as recited in claim 129, wherein said lower mole ratio is about
0.05.	
30	. 28 (new) The method as recited in claim 129, wherein said upper mole ratio is about
<u>0.3.</u>	28
3 1 132.	(new) The method as recited in claim 129, wherein said acid is added in an
amount result	ting in a pH of said silica precursor solution of from about 1 to about 4.
32-133.	(new) The method as recited in claim 132, wherein said pH is about 2.
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	(iii) providing said surfactant and said silica precursor in a mole ratio that is	
above a lowe	r mole ratio that produces a non-porous silica phase and below and upper mole ratio	
that produces	a lamellar phase; and	
	(iv) said forming includes diluting with an alcohol.	
53 154.	(new) The method as recited in claim 153, further comprising adding a pre-	
	polymer to said silica precursor solution making a pituitous mixture.	
<u>54</u> 185.	(new) The method as recited in claim 153, wherein said rapidly evaporating is by	
spin-casting.	,	
55 _{15.6.}	(new) A method of making a mesoporous film on a substrate, the method	
comprising th	•	
(a)	combining a silica precursor with an aqueous solvent, an acid catalyst and an	
ammonium ca	ationic surfactant into a precursor solution;	
(b)	dispensing said precursor solution onto the substrate;	
(c)	forming a film by evaporation of the solvent in less than 5 minutes; and	
(d)	heating the film on the substrate to a temperature sufficient to decompose the	
surfactant, the	ereby producing a mesoporous film on the substrate.	
56 151.	(new) The method of claim 156 wherein the precursor solution is a silica	
	ation and wherein the surfactant and the silica precursor solution are in a mole ratio	
that is above a	a lower mole ratio that produces a non-mesoporous silica phase and below an upper	
mole ratio tha	t produces a lamellar phase.	
57 _{158.}	(new) The process of claim 156, wherein the film exhibits an index of refraction	
between 1.16 and that of silica.		
58 _{159.}	(new) A process to form mesostructured films, comprising:	
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